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Expanding the protected area network in Namibia: An institutional analysis

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ABSTRACT

Protected areas remain vital to global conservation efforts. To simultaneously improve biodiversity conservation and promote human well-being, protected areas cannot be considered separate from their surrounding landscapes. As such, protected areas and adjacent landscapes are increasingly being viewed as integrated. Planning for such multifunctional landscapes requires an understanding of the institutional context, since institutions serve as an interface between the social and ecological components of a system. Here, we assessed the institutional aspects (i.e. norms or rules-in-use) of including various land use practices around Etosha National Park in Namibia into an integrated conservation landscape. The present landscape provides several ecological benefits, including provisioning ecosystem services (pasturage and water) and cultural ecosystem services (hunting and tourism). Data on stakeholder perspectives and resource governance were obtained from semi-structured interviews conducted with park management, landowners, farmers and communal residents. We identified six distinct resource governance systems, each variably focused on ecosystem services and each guided by different institutions that shape stakeholder behavior. A broad repertoire of norms and shared strategies were found to be practiced in isolation from each other and constrained by land tenure. Expanding the protected area network requires integration of the different governance approaches and a landscape approach to management.

1. Introduction

Biodiversity is under increasing pressure due to growing human populations, climate change and unprecedented economic, social and political shifts; such that approximately 60% of the world's ecosystems are considered as degraded (MA, 2005). These pressures are a result of the interactions between anthropogenic and ecological processes that alter the delivery of ecosystem services (Haines-Young and Potschin, 2010; Sandifer et al., 2015). Ecosystem services, or the benefits people derive from nature, are continuously being threatened by the degradation and transformation of natural habitats (Vitousek et al., 1997; MA, 2003, 2005; Reed et al., 2015). Although protected areas have typically been viewed as vital in conserving biodiversity and curbing this destruction, the importance of incorporating areas adjacent to national parks and reserves is increasingly being acknowledged (Bengtsson et al., 2003; Chape et al., 2005). In southern Africa, multifunctional landscapes try to integrate protected areas with commercial and communal rangelands, thereby combining conservation, production and landscape use (Hannah et al., 2002; Harrington et al., 2010; O'Farrell and Anderson, 2010; Zeller et al., 2017). This inevitably depends on the inclusion of a broad range of stakeholders, including landowners, park rangers, commercial and communal farmers; who collectively manage ecosystems and who share the benefits, as well as the costs, of living in an integrated landscape (Ervin et al., 2010).

In Namibia, an expansion of the current protected area network, through the formal incorporation of national parks and adjacent rangelands, is aimed at not only improving ecosystem service provision but also to improving human well-being and land reform (Ashley and Barnes, 1996; Barnard et al., 1998; Jones, 2004). To do so justly and sustainably, an expanded protected area network will have to grapple with the complex ecological, political and economic factors that drive land use change, as well as the role protected areas play in providing benefits to resident communities and the possible costs involved therein (Maciejewski and Cumming, 2015; Cumming et al., 2015). Such an integrated

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approach to protected area governance also requires an understanding of the institutional context, since institutions, i.e. the rights, rules and relationships regulating resource use; serve as an interface between the social and ecological components of systems (Bromley, 1992; Schlager and Ostrom, 1992). It is at this interface that institutions create incentives for social behavior, for example by deterring exploitation, free-riding, destruction or negligence (North, 1990; Ostrom, 1990; Ostrom et al., 1999; Rudd, 2004). By enabling or constraining activities, institutions generate observable patterns of behavior (Scott, 2014) which in turn actualize policy outcomes (Polski and Ostrom, 1999). Thus in order to evaluate, design or reform policy, there is a need to systematically analyze existing institutional arrangements.

Land use changes have occurred in Namibian rangelands that involve landowners converting from cattle farming to wildlife management (Göttert and Zeller, 2008; Barnes and Jones, 2009). This is attributable to legislation passed in the 1960s that afforded private landowners ownership over wildlife species such as oryx (*Oryx gazella*), springbok (*Antidorcas marsupialis*), greater kudu (*Tragelaphus strepsiceros*), African buffalo (*Syncerus caffer*) and warthog (*Phacochoerus africanus*) (Long and Jones, 2004). The devolution of rights over wildlife to the landowner led to new hunting enterprises, changing perspectives on the value of having wildlife species on private properties (Barnard, 1998). Policies implemented in the 1990s afforded similar rights to communities, with the formation of communal conservancies (NACSO, 2014). As legally registered areas with a constituted management body collectively run by communities, communal conservancies provide resident communities with resource use rights and access to benefits from tourism and hunting, rights previously afforded only to private landowners (Weaver and Peterson, 2008).

Changing land use policy has generally favored pro-conservation practices such as the maintenance of biodiversity in game reserves and the protection of charismatic species and scenic landscapes on game farms and conservancies (Barnes and Jones, 2009). Many landowners and resident communities have gradually moved away from livestock production toward the consumptive use of wildlife, through hunting and game meat production, and the non-consumptive use of natural resources (i.e. ecotourism) involving mostly photographic safaris and educational tours (Boudreaux, 2010). Due to biophysical and socio-economic conditions (i.e. aridity, unpredictable rainfall and sparse human populations), the opportunity costs of alternative land uses, such as agriculture, are minimal (Roe et al., 2009). Institutional structures have also enabled cooperation between the private sector and communal conservancies, since the latter are now recognized legal entities, further encouraging partnerships surrounding land use practices dependent on the natural resource base.

To safeguard natural resources, efforts are being made by the state to formalize the expansion of the protected area system by integrating pro-conservation land use practices and protected areas into conservation landscapes (Brown et al., 2005; Zimmermann et al., 2014). We argue that to formulate appropriate policies, it is important to assess the institutional challenges of bringing different land uses together in an integrated conservation landscape. To provide insight into natural resource management, we use the ecosystem services approach (Wallace, 2007; Fisher et al., 2009; Wesselink et al., 2011) since it recognizes the complex interactions occurring across integrated landscapes (Turner and Daily, 2008; Fisher et al., 2009). The aim of this paper is to examine the institutional arrangements currently at play in the Namibian protected area landscape, particularly surrounding the Etosha National Park (ENP). Institutional arrangements, including property rights, policy reforms and land use practices, have led to integrated landscapes that encourage joint biodiversity conservation and human development. We thus examine the ENP and surrounding farms and conservancies, applying the Institutional Analysis and Development (IAD) framework (Ostrom, 2005) to identify the institutional attributes that have contributed to the current governance structures. We focus the discussion around ecosystem services, asking how biophysical, social-ecological and governance attributes have interacted to facilitate the current integrated landscape.

1.1. Collective governance of ecosystem services

The present landscape, comprising ENP and surrounding rangelands, provides several ecological benefits to park management, visitors, landowners and resident communities. The most important provisioning ecosystem services are pasturage (i.e. grazing) and water, while desert-adapted mega-fauna supports cultural ecosystem services, such as hunting and tourism (Lindsey et al., 2013). The former includes grasslands to sustain both livestock and wildlife while ground and surface water, supplied through intricate aquifers and fluvial systems, provide water to people, livestock and wildlife (Hipondoka et al., 2013). The biodiversity present in the region, particularly the abundance of free-roaming mammals and endemic bird species, supports consumptive and non-consumptive tourism enterprises and is a major driving force behind the conversion from cattle production to pro-conservation practices. To collectively manage this increasingly integrated landscape, the types of ecosystem services appropriated need to be considered (MA, 2003; de Groot, 2006; de Groot et al., 2010). The institutions and decision-making context for which the ecosystem services are being considered needs to be assessed (Fisher et al., 2009), since the values attributed to ecosystem services drive land use decision-making (Ban et al., 2013; Guerry et al., 2015; Ruckelshaus et al., 2015) and influences landscape planning (Reed et al., 2009; Wegner and Pascual, 2011). Although a great deal of the literature is dedicated to the role of communities in social-ecological systems (Berkes et al., 2003), little is known about the involvement of local institutions in decision-making and conservation planning pertaining to landscape management (Pimbert and Pretty, 1997; Andrade and Rhodes, 2012).

Applying the ecosystem services approach to a consideration of conservation landscapes facilitates a more critical focus on natural resource governance and stakeholder participation by directing attention to the human-nature interaction (Wesselink et al., 2011). Ecosystem services are construed in various decision-making processes embedded in institutions, from day-to-day operational choices, to collective decisions to constitutional resolutions (Ostrom, 2005). Ecosystem services differ in terms of whether there are governance systems in place to regulate their use and whether access to the ecosystem service can be determined (Primmer and Furman, 2012). Furthermore, ecosystem services dependent on larger landscapes to function are governed by land use planning while particular ecosystem services are at times governed by specific policy instruments (Primmer and Furman, 2012). Identifying the institutions at play in any particular context allows for an understanding of what has produced the current management system and provides an indication of which institutions will condition future recommendations (Primmer et al., 2015).

1.2. The Institutional Analysis and Development (IAD) framework

The Institutional Analysis and Development (IAD) framework serves as a multidisciplinary tool used to frame policy research on common pool resources, i.e. resources jointly managed and/or used by a group rather than by an individual (Ostrom, 1990, 2005; Ostrom and Cox, 2010; Ostrom et al., 1994). The IAD framework serves the purpose of our research in that it can be applied to the analysis of public and privately owned resources that depend

on cooperation between individuals if long-term sustainability is to be achieved (Rudd, 2004). The general elements of the framework are depicted in Fig. 1. Ostrom (2005, p. 15) proposed that the unit of analysis be the 'action arena', i.e. the social space where 'participants with diverse preferences interact, exchange goods and services, solve problems, dominate one another, or fight (among the many things that individuals do in action arenas)'. The contextual variables that frame (and constrain) the action arena need to be specified. These include variables associated with the physical and material world in which the actors interact (i.e. the biophysical conditions), the attributes of the community (i.e. socio-economic factors) and the rules-in-use (i.e. institutions) that govern their behavior.

In this paper, we focus on the key institutional attributes associated with an expanded protected area network in Namibia. Here the action arena comprises all 'actors' pertinent in the collective management of the conservation landscape and its ecosystem services (i.e. landowners, park management and resident communities) and the 'action situation', where these actors observe information, select actions, engage in patterns of interaction, and realize outcomes from their interaction (Ostrom and Cox, 2010). The ENP and surrounding territories is moving toward a conservation landscape where multiple land uses are being practiced by a variety of actors. By applying the IAD framework (Ostrom, 1990, 2005; Ostrom and Cox, 2010), we attempt to understand the patterns of interaction surrounding different land uses and provide insight into institutional factors currently affecting the collective management of ecosystem services in the landscape. This serves as an analysis of the performance of the policy system governing protected area expansion and allows for a comparison with alternative policies.

2. Methods

2.1. Study area background and description

When the ENP was proclaimed in 1907, it covered over 100,000 km^2 and included the area presently dedicated to the Skeleton Coastal National Park (Fig. 2). The park boundaries have since been reduced to now encompass 22,270 km^2 including the renowned Etosha Pan (4760 km^2). Our study area comprised fragments of the original boundaries of the ENP, including farms to the south and south west of the park, two communal conservancies on its western boundary and a state-owned resettlement farm, Seringkop (Fig. 2). Due to the topography, geomorphology and hydrological processes present in the landscape, these study sites were deliberately selected since they will be the first to be incorporated into an expanded protected area network around the formally protected ENP (Brown et al., 2005). Regarding property rights and access to resources; there are three tenure regimes in Namibia that condition land and natural resource use and management (Bethune and Ruppel, 2013). These regimes are expressed in state land (used for nature conservation and game parks), private land (freehold, i.e. privately-owned properties) and communal land (state-owned land that is held and managed according to customary tenure systems), all of which are present in the study area.

The area is arid and rainfall is highly variable and unpredictable (Mendelsohn et al., 2002). The resultant lack of readily available fresh water is considered a limiting factor for development across Namibia (Jones, 2003). Underground water is commonly sourced through pipelines and boreholes on livestock farms and then supplied to animals through pumps and troughs or from small dams constructed on ephemeral rivers and streams (Mendelsohn, 2006). Wildlife usually obtain water from isolated pools during the rainfall season or from artificial waterholes fed by boreholes throughout the rest of the year. Surface water is supplied from the Cuvelai system in the north, an intricate fluvial system that floods the region during the rainfall season (Lindeque and Archibald, 1991). Groundwater flows into the landscape from the south due to the karst topography that feeds numerous springs, both contact and artesian, and seepages all the way to the southern edge of the Etosha pan (Hipondoka et al., 2013).

The lack of arable soils is another important limiting factor for agriculture and livestock production. Soils are nutrient poor and are easily degraded (Mendelsohn, 2006). The combination of low rainfall and poor soils means that the availability of grazing on rangelands varies spatially and temporally and that the carrying capacity is low.

2.2. Data collection and analysis

We take a qualitative, case study approach to examine the multiple processes of land and resource governance and stakeholder perspectives regarding ecosystem services. We used the IAD framework to structure the analysis by identifying key components (i.e. exogenous variables, action arena, actors and action situations, interactions and outcomes) that matter to the scale of our case for investigating institutions and ecosystems services in the ENP conservation landscape. Data was collected from land owners and managers (n = 20), senior and junior level Namibian Ministry of Environment and Tourism (MET) officials (n = 4), senior-level ENP management and game rangers (n = 8) and NGO staff (n = 6). Representatives from the Namibian veterinary services, the Kunene regional land board and the traditional authority were also included (n = 3). In the heavily populated communities, namely the ≠Khoadi-//Hoas and Ehi-Rovipuka conservancies and on the Seringkop resettlement farm south of the park (Fig. 2), instead of individual interviews, 12 households were selected in each loca-

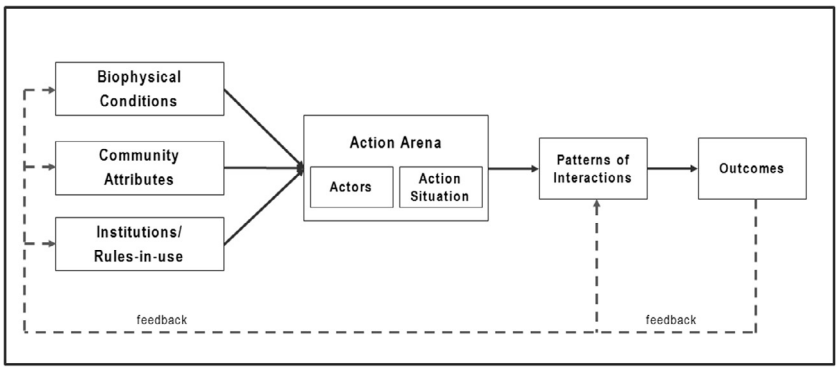


Fig. 1. General elements of the Institutional and Development (IAD) framework, as adapted from Ostrom et al. (1994).

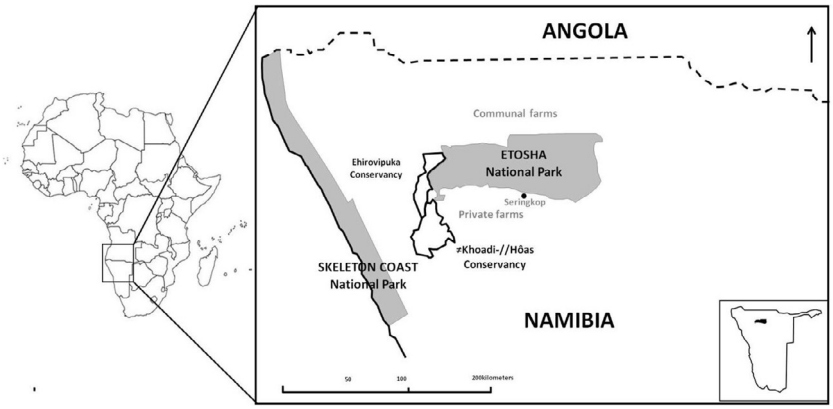


Fig. 2. Map of the study area.

tion (Table 1) via a systematic sampling strategy (Newing et al., 2011). Field data were collected in two phases, from April to May 2013 and July to August 2015, during individual interviews, community meetings, focus groups and feedback sessions. To ensure anonymity, codes were used for respondents quoted or mentioned in the text (placed in parentheses). Additionally, an analysis of primary and secondary documents related to land and natural resource policy was incorporated (Appendix 1). We attempted to triangulate the data by incorporating feedback from practitioners in the field and experts on policy matters in Namibia throughout the data collection and analysis phase.

The interview protocol (Appendix 2) started off with a discussion surrounding the observed outcomes of the current land and resource use policy. Respondents then identified the biophysical conditions, community attributes and institutional factors that shape the patterns of interactions regarding the use of ecosystem services in and around the ENP. To ascertain the biophysical conditions shaping the action arena, respondents were asked about land and resource management issues and conflicts, their perceptions regarding the causes of these issues and conflicts, the contributing factors thereof and what they believed to be mitigating circumstances or solutions. To develop a preliminary understanding of community attributes, experts with prior experience of working in and around ENP and protected areas in Namibia were consulted. Respondents were questioned on the minimal but necessary set of rules that are required to explain the observed policy-related actions, interactions and outcomes to establish the institutions or rules-in-use that govern the action arena and shapes the behavior of actors. These included the formal laws and policies in place to govern actions and interactions in the action arena as well as the level at which these are enforced, namely at the local 'operating' level, the 'collective-choice' community level or at the 'constitutional', central government level (Ostrom, 2005). The management strategies applied in each land use was determined by asking questions related to the recurring patterns of behavior surrounding land use, resource use, agricultural markets, and the tourism industry and how these are linked to the benefits provided by the natural environment. Questions were also asked about the observed outcomes of land and resource use policies 'on the ground' (*de facto* norms) compared to what is set out in the policies (*de jure* rules), which of these outcomes are satisfactory, which are not and which outcomes are most important.

The biophysical conditions and community attributes that affect the action arena were analyzed in a separate study, using conflict and stakeholder analysis techniques (Mannetti et al., submitted for publication). For the institutional analysis, codes were assigned to words, phrases and sentences (Charmaz, 2006) that referred to respondents' perceptions on rules-in-use or institutions shaping land and resource use and how these rules affect the management thereof. The governance structures present in the study area were identified based on similarities and differences in the mentioned interactions and outcomes. Using QSR-NVivo (version 10), categories were then developed from codes, giving inference to the different resource governance systems and institutional dimensions present in the study area. The different categories were assessed according to attributes described in McGinnis and Ostrom (2014).

Table 1
Study sample of individuals interviewed during the study.

Stakeholder category	Number of people/households interviewed
Conservancies:	
- ≠Khoadi-//Hoas	12
- Ehi-Rovipuka	12
Private properties:	
- Livestock producers	6
- Tourism/hunting facilities	6
- Combination farmers (livestock production and hunting and/or tourism)	8
Resettlement farm:	
- Seringkop	12
Other:	
Etosha National Park Management	8
State Veterinary Department	3
Ministry of Environment and Tourism	4
NGO representatives	6

3. Results

The ENP and surrounding rangelands are managed for multiple values linked to different land use practices. Core goals and principles include financial gain ($n = 36$), cultural beliefs ($n = 19$), sustainable use ($n = 17$), compliance to land reform ($n = 8$) and conservation mandates ($n = 15$) as well as the intrinsic ($n = 6$) and bequest ($n = 6$) value of nature. Exogenous variables, including policy changes, recurring drought and land restitution have resulted in an integrated landscape variably dedicated to conservation, livestock production, consumptive and non-consumptive tourism and cultural heritage. These all depend to some extent on ecosystem services, particularly biodiversity, grasslands and above- and belowground water systems. The ecological functions supporting and regulating these ecosystem services however, are not spatially defined and the institutions shaping their use vary

across the landscape (*pm1, pm5*). According to respondents, the different land use practices have led to differences in how ecosystem services are perceived and valued (*m6*). This has resulted in conflict in some cases and cooperation in others (*e2*). To offer insight into these interactions, the institutions that have shaped them, and the outcomes thereof, we report the findings in accordance to the IAD framework.

3.1. Biophysical conditions

The land and natural resource management challenges mentioned by respondents were related to primary land use (i.e. whether respondents had livestock or not). Where land use was dedicated to livestock production, management challenges were different on white-owned private farms as compared to black-owned and/or communally farmed areas. White-owned farms are typically bigger in size (between 6000 and 8000 ha, Olbrich et al., 2016). These farms were also more established due in part to decades of experimentation, access to research findings and expensive advisory services. White-owned farms were typically well fenced and subdivided into several paddocks to allow for rotational grazing. Livestock in both the commercial and communal areas were raised under extensive ranching conditions, relying on natural pasture. Although stocking rates were more conservative on commercial farms as compared to the communal areas, fire had mostly been excluded from the system and, except on the combination livestock and game farms; very few browsing animals were present.

Black-owned farms were less established and had more issues with water and grazing availability as a result of poor infrastructure (e.g. boreholes, roads, and fences) and larger herd sizes. In communal areas (conservancies and resettlement farms), despite the larger properties, more people were sharing the commonage and resource overuse as well as large-scale damage of infrastructure was prevalent. Although almost all respondents cited problems with the availability of surface water and complications involved in attaining underground water; and most livestock farmers considered the availability of grazing a challenge, the situation was worse on black-owned and communal (state-owned) properties. This then made the perceived land use conflicts with neighboring properties or with the ENP worse, since black and communal farmers were already battling management challenges onsite. Therefore, conflicts experienced with neighbors and the ENP depended on land tenure (private, communal conservancy or state-owned resettlement farms) and not the land use.

3.2. Community attributes

For the community attributes component, stakeholder analysis was used to categorize the stakeholders according to proximity to the national park, land tenure and land use type. Four primary stakeholder groups were identified, namely livestock farmers, communal conservancy members, resettlement farmers and tourism/hunting enterprises (Table 2). Overall, stakeholders are not homogenous and differences exist within and between the groups in terms of interest in and support toward an expanded protected area network as well as power to enforce such change. Livestock farmers, although interested in the concept of being integrated into the protected conservation landscape, mostly opposed protected area expansion on both private property (64%) and land owned by the state (i.e. resettlement farms, 73%). In assessing their stated interest it became clear that this difference in opinion is linked to the benefits derived from ecosystem services (e.g. pasturage, water provision, maintenance of natural habitats) which made them interested in being part of an integrated landscape. Regarding perceived disadvantages of being part of the protected area network, diverse opinions were expressed within the same stakeholder groups, some of which were contradictory to their stated advantages. In the communal conservancy stakeholder group, mentioned advantages of being adjacent to the park included consumptive and non-consumptive benefits being derived from an increase in wildlife populations. In the same stakeholder group, increased human-wildlife conflict was considered a disadvantage. This indicates diversity in opinion on the same issue, due to different perceptions surrounding the benefits of living adjacent to a protected area.

Another reported difference in the community related to power, or the resources people or groups are believed to posses to enable them to mobilize and express their position on matters concerning the integrated landscape. The majority of the power rests with private land owners, since under freehold title they are entitled to use their land as they deem fit. Although considered to be primary stakeholders in the landscape, communal conservancy members and the resettlement farmers were considered to have less power to enforce their position. Since they do not own the land and have neither the resources nor, in most cases, the ability to mobilize them to decisively determine outcomes regarding landscape management.

3.3. Institutions or Rules-in-use

Together with the respondents, six distinct land and natural resource management strategies were identified based on categories that emerged from the interview data. The different management strategies are summarized in Table 3. The relevant policy arena that conditions access to and use of natural resources is specified. These included the environment, agriculture, tourism and land reformation policy arenas. To give an indication of scale, we considered the strategies in terms of geographic range and the size of the population that partakes, or is subject to, each system of governance. Land area ranged from 600 km^2 for the resettlement and livestock farms to more than 22,000 km^2 comprising the ENP. Population density differed vastly in the study area from 1 person per km^2 in both conservancies as compared to 1 person per 10 km^2 on land dedicated to livestock production, freehold conservancies and hunting and tourism enterprises.

Assessing the management strategies on a broader level, we specified the logic upon which each approach is organized (Table 4). These included monocentric systems as practiced in the livestock production and state national park management systems. Here the authority to determine and enforce rules are vested in a single decision-making structure, namely the landowner or park warden, respectively. In the conservancies, both communal and freehold, polycentric systems dominated with several people or groups of people and decision-making structures assigned relatively autonomous prerogatives to determine, enforce or alter institutions. The different types of organizations responsible for formulating and implementing the rules in the different management strategies included governmental, community-based, and non-governmental organizations. The nature of the rules these organizations generate and put in place were also reported. We narrowed the rules down to whether they operate at local, regional, national or international scales.

We distinguished among rules directed at operational-level decisions (e.g. maintenance of boreholes and firebreaks), those guiding collective-level choices (e.g. controlled burning schedules, land use planning and zonation) and those relating to constitutional-level questions (e.g. export of hunting trophies, punishment of poachers). We report only on rules relating to property rights and the use of ecosystem services. In the state protected area, although day-to-day operational decision-making is delegated to the level of warden, these all need to comply with the

Table 2
Community attributes of the four primary stakeholder groups.

Respondents (n = 56)	n	Land tenure	Length of occupancy (years)	Position[1]	Interest[2]	Power[3]
Livestock farmers	29	Private (n = 8) Communal (n = 15) Resettlement (n = 6)	>30 15–18 6	Negative Slightly negative Slightly negative	High Limited No or minimal	High Medium Low
Communal conservancy members*	9	State	18 (≠Khoadi- //Hôas) 15 (Ehi Rovipuka)	Positive slightly positive	General limited	Medium
Resettlement farmers*	6	State (99 year leasehold)	6	Slightly negative	No or minimal	Low
Tourism/hunting enterprises	12	Private	5–10	Positive to strongly positive	High	High

* Those communal conservancy and resettlement farm respondents *without* livestock.
[1] Level of support or opposition to becoming part of the conservation landscape.
[2] Aggregate interest scores for the different stakeholder groups (1–2 = *no or minimal interest*, 3–4 = *limited interest*, 5–6 = *general interest*, 7–8 = *high interest,* 9–10 = *primary interest*) to being incorporated into the conservation landscape.
[3] Refers to the resources a stakeholder is able to mobilize in order to express their position, *low* (neither the resources nor the ability to mobilize the resources), *medium* (having one of either the resources or the ability to mobilize them), or *high* (both the resources and the ability to mobilize the resources).

Table 3
Land and natural resource governance systems applied in and around Etosha National Park (ENP).

Governance system	Policy arena	Policy	Geographic range (km^2)	Population size	Excludability*
National Park	Environment	Nature Conservation Ordinance of 1975	22270	–	No access
Communal Conservancy	Environment Land reform Agriculture	Policy on Wildlife Management, Utilisation and Tourism in Communal Areas 1995 Nature Conservation Amendment Act 1996 Traditional Authorities Act 1996	5000	~7000	Difficult to exclude non-members
Livestock farmers	Agriculture	Agricultural (Commercial) Reform Act 1995	600	~60	No access
Tourism/Hunting enterprises	Tourism	National Tourism Policy 2008	1000	~50	No access
Freehold conservancy	Environment Tourism	Agricultural (Commercial) Reform Act 1995 Policy on Establishment of Conservancies in Namibia 1992	600	~50	No access (collaborative agreements regarding who may enter)
Resettlement farms	Land reform Agriculture	National Land Policy 1998 Communal Land Reform Act 2002	600	~1500	Difficult to exclude non-members

* Or possibility of preventing non-members from benefiting from resources.

policies and laws set out in the Nature Conservation Ordinance of 1975. In the livestock production and hunting and tourism enterprises categories, all decisions pertaining to ecosystem services are at the discretion of the landowner or manager. In the freehold conservancy approach, individual landowners need to jointly approve decisions regarding the combined properties.

In the communal conservancies, the only operational choices that can be made on an individual level relate to a communal conservancy member's livestock and their crops. Any other decisions regarding grazing, water use and appropriation, or natural resources; are constrained by rules conceived at the constitutional level. Unique to the communal conservancy management strategy are the rules prescribed for monitoring and sanctioning (i.e. wildlife numbers need to be observed, any incidences involving wildlife species recorded and any violation regarding natural resource use reported so as to set sustainable harvesting quotas). In Namibia all conservancies need to prescribe to the monitoring and evaluation of natural resources if they wish to benefit from the use thereof. Each conservancy, however, needs to collectively promulgate such rules, depending on their context, and implement such rules on an operational-level.

3.4. Patterns of interaction in the action arena

The current structure of the action arena, or the set of criteria and rules that frame social-institutional processes and distill stakeholder decision-making, is a direct result of exogenous variables acting on the system as early as the 1960s. Several respondents (n = 19) mentioned the legislation passed in the 1960s and 1970s that enabled landowners to utilize wildlife on their land, prompting them to convert from livestock production to wildlife management. The rising demand for tourism and safari hunting during the 1980s provided the necessary incentives for some to diversify to wildlife ranching (n = 11), while recurrent drought (n = 7), declining range productivity due to livestock overstocking (n = 1) and decreasing state subsidies for cattle farming (n = 4) encouraged others. This in turn led to an increase in the wildlife population in the area, which impelled the newly independent Namibian government to devolve similar rights over wildlife to black communal farmers (NACSO, 2013). As a result, land and natural resource use rights are now possessed by a diverse group of individuals and groups surrounding the ENP, namely livestock farmers, communal conservancy members, resettlement farmers and tourism/hunting enterprises. These groups view the expansion of a protected area landscape, and their inclusion therein, differently depending on the types of ecosystem benefits they derive from the land. This affects the way they manage their land and resources which is manifested in the six different management strategies identified.

Furthermore, the increased area now dedicated to pro-conservation land use practices and the resulting increase of wildlife populations has led to changes in the way ecosystem services '*are being valued across the landscape*' *(m6, pm3)*. For the livestock farmers this has led to an increase in human-wildlife conflict, with several respondents citing either the loss of livestock due to predators (n = 21), damage to infrastructure by wild animals (n = 12), or crop raiding (n = 4), mostly by elephants (*Loxodonta africana*).

Confounding the human-wildlife conflict issue, especially in communal areas, is the lack of water and suitable grazing for live-

Table 4
Nature of the different rules and decision-making structures governing land and natural resource management strategies in and around Etosha National Park (ENP).

Governance system	Land tenure	Decision making structure	Nature of decision-making structure	Level	Regime type	Nature of rules (i.e. scale)	Level at which rules are directed
National Park	State protected area	Ministry of Environment and Tourism	Public (state)	Central government	Monocentric[1]	National	Constitutional
Communal Conservancy	Communal land	Community	Hybrid (government, community-based, non-government organizations)	Local government (communal land board and traditional authority) Regional (regional land board)	Polycentric[2]	Local regional national	Collective-choice
Livestock farmers	Commercial land	Private individuals	Private individuals	Citizen (title deed holder)	Monocentric[1]	Local	Operational
Tourism/Hunting enterprises		Private individuals	Private individuals and corporate entities	Citizen (title deed holder)	Monocentric[1]	Local National International	Operational
Freehold conservancy		Private individuals	Private individuals and cooperatives	Citizen (title deed holder)	Polycentric[2]	Local Regional	Operational Collective-choice
Resettlement farms		Community	Public (state)	Local government (traditional authority	Monocentric[1]	National	Operational

[1] Authority to determine/enforce rules are vested in a single decision-making structure.
[2] Several individuals/groups and decision-making structures determine, enforce or alter institutions.

stock. Community conservation is based on the premise that traditional land use practices, including pastoralism, should occur alongside nature conservation. Traditional authorities and communal land boards allocate customary land rights, thus controlling access to pasturage and water. Respondents however, cited that the traditional authorities are not physically present (*c1-9*) and that the lack of rights over common pool resources means that some communal conservancy members lose benefits (*c1-7*). In terms of private landowners, tourism and hunting enterprises are encouraged and supported by the National Policy on Tourism to use wildlife in a competitive, sustainable and equitable manner. Respondents from the tourism and hunting sector, however, mentioned *'increasingly being shunned by neighboring livestock farmers, particularly after the occurrence of a livestock predation event in the area by lions'* (*h2*).

The '*fence issue*' was mentioned by both communal conservancy members and private landowners (*c1-2, c2-2, c2-4, h2, r1*). Maintenance of the perimeter fence is the responsibility of different directorates within the MET (*e5*, *m2*, *v1, e1*). Also, the placement of a veterinary cordon fence means that tourism enterprises south of the ENP are prohibited from re-introducing buffalo (*S. caffer)* on their properties, a lucrative economic opportunity as they will then be able to attract visitors by offering *'the Big Five'* (*t1*, *t2*).

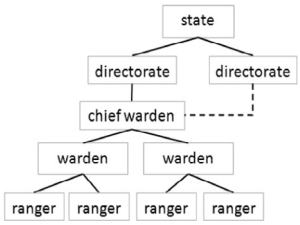
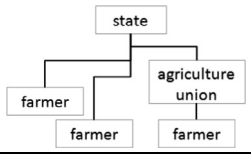
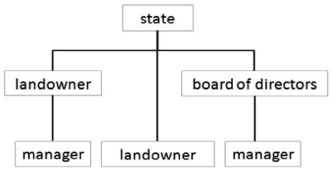
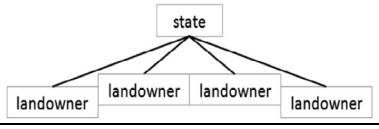
3.5. Outcomes

Looking at the repertoire of norms and shared strategies available to participants in each management strategies to deal with the above interactions, we find a myriad of approaches (Table 5). In the ENP, the outcome is the classic 'fortress' or 'command-and-control' approach that has been in place since the park was proclaimed and currently prescribed by the Nature Conservation Ordinance of 1975 (*s3*). In the livestock production management system, occurring on private land where the title deed is conferred by or based on inheritance (Bethune and Ruppel, 2013), the rules-in-use are typically also passed on from one generation to the next (*p5*, *p7*). Livestock farmers need to comply with a set of (formal) rules in order to partake in markets (e.g. policies regulating the transport of live animals, quarantines and vaccinations prior to the sale of animals). However, their operational choices are guided by well-established (informal) institutions based on the instrumental value of nature (*p1*, *p9*, *pm4*).

The more recently instituted conservancy model (i.e. in place for less than 20 years) means that communal and freehold conservancies are guided by more innovative approaches to landscape management (*e1*, *e2*, *n4*). In communal conservancies, the policy sets out that traditional pastoral practices are to occur alongside biodiversity conservation. Each conservancy needs to collectively stipulate zones for wildlife and wildlife-based ventures, monitor biodiversity, grazing and water availability, and on an operational level, manage land and its resources sustainably (*e1*). Freehold conservancies, on the other hand, despite having removed boundary fences between individual properties, are still privately-owned, and the range of norms guiding this management system are those of each individual landowner. A Parks and Wildlife Management Bill was introduced in 2009 to provide the necessary framework for adoptive co-management of natural resources in such areas (Zimmermann et al., 2014). It has however remained in draft format since.

Since institutions also define relations among people concerning resources, in this case access to ecosystem services, we report on the network structures among rule-making structures in the population subject to these rules. Apart from in the communal conservancy, very little connectivity was evident in the study area. In the state protected area management system the structure was found to be hierarchical, with park wardens having to report to

Table 5
Institutional outcomes of each management strategy practiced in and around Etosha National Park (ENP).

Governance system	Governance approach	Norms/shared strategies	Network structure	Historical continuity*
National Park	Biodiversity conservation priority Strict Protectionism Law Enforcement	Command-and-control		Long period (proclaimed in 1907)
Communal Conservancy	Sustainable natural resource management Economic instruments to enable partnerships with the private sector Local grazing rights allocated under Customary Land Rights	Joint management of natural resources alongside traditional pastoralism		Recent (first conservancy formalized in 1998)
Livestock farmers	Title deed holder free to manage land and its resources as they see fit, depending approval by Land Board	Grassland-based livestock production driven by meat industry demands		Long period
Tourism/ Hunting enterprises	All tourism needs to be economically, socially and ecologically sustainable Provides framework for public–private partnerships	Management of wildlife and grasslands driven by tourism market and informed by regional trends/science		Medium term
Freehold conservancy	A group of farms on which neighboring landowners have pooled their resources for the purpose of conserving and utilizing natural resources	Adaptive joint management of landscape		Recent
Resettlement farms	Local grazing rights allocated under Customary Land Rights	Unitary land system/equitable use of land for subsistence-based livestock farming		recent

* Distinguishes period of time a system has been in place.

directorates based in the county's capital over 600 km away. Communal conservancy members reported having strong ties among each other and with neighboring communities ($n = 10$), based on family structure and land allocations made by the traditional authority. In the communal conservancy management strategy regional land boards and traditional authorities, via local traditional leaders (i.e. chiefs and headmen), work closely with community representatives. Community representatives are elected in compliance with rules dictating the creation of communal conservancies and act as bridging agents between the community and traditional authorities regarding natural resource matters (*c1-3*, *c1-4*, *c2-4*). This component is lacking in the resettlement farm management strategy, where there are no such structures in place for natural resource rule-making and implementation.

4. Discussion

We analyzed the current land and natural resource management systems in and around ENP. The systems are conditioned by land tenure and to a lesser extent, land use. Interactions are linked to an increase in wildlife populations in the study area. According to Lindsey et al. (2013), the increase in wildlife populations are the result of the expansion of wildlife-based land uses. Alongside growing human populations, this has led to an increase in human-wildlife incidences (NACSO, 2015). Now that more land is dedicated to pro-conservation land uses and more people are living together with wildlife, the perception of conflict has also changed (Jones and Barnes, 2006). Different policies determine the management approaches used in the different land and natural

resource governance systems. This means that policy implementation pertaining to natural resource management is occurring in isolation. The current governance approaches, as isolated institutional approaches in the landscape, do not provide a suitable fit to the ecosystem services attributes of the study area. An integrated approach, as proposed by the Parks and Wildlife Management Bill of 2009 could provide an enhanced fit. Despite the slow passage of the Bill, other initiatives have embraced an integrated approach to incorporating different land uses compatible with biodiversity conservation and under different land tenure.

At present, ENP and its surrounding properties all manage their resources for different purposes and based on different values. The national park, a state protected area, is managed for the joint purpose of biodiversity conservation and to generate income from tourism (MET, 2010). The park is fenced and access is strictly controlled. The free movement of wildlife is prohibited by a poorly-maintained double fence (Jones and Barnes, 2006). Although the legislation stipulates that valuable game species and specially protected species, such as African elephant (*L. africana)* and black rhinoceros (*Diceros bicornis*), are the property of the state, in effect, the porous fence means that wildlife leave the park regularly. The opposite is also true with livestock from the communal conservancies regularly grazing inside the national park.

In the communal conservancies, the lack of suitable grazing for livestock and inadequate water for people, livestock and wildlife has worsened the human-wildlife conflict issue. Jurisdiction over the allocation of water and grazing lies with the traditional authorities and as Mendelsohn et al. (2011) has pointed out; this lack of rights at the individual level has left communal conservancy members powerless regarding common pool resources. Also, because those dependent on livestock production in these areas attain diverse benefits from livestock (including milk, hides, draught power – to pull heavy loads, and various cultural benefits), and because they only sell their livestock to meet cash needs, they are more affected by drought, over-grazing and predation. Since they do not regularly go to market to lessen herd sizes, they are more adversely affected by these events.

Private livestock farmers, on the other hand, focus on herd turnover, are more capital-intensive, and can afford insurance schemes to offset losses due to drought or predation. These farmers have absolute title to land, conditional to regular monitoring and various sectorial policies, such as those governing livestock vaccination and the export of beef. Dependent on provisioning ecosystem services such as water and pasturage, private livestock farmers are becoming increasingly isolated in the landscape with more and more of their neighbors converting to wildlife-based land practices. This means that they are increasingly operating their farms as closed-systems, with less water and less suitable grazing as a result of bush encroachment (de Klerk, 2004; Barnes and Jones, 2009).

Although the primary objective of hunting and tourism enterprises is typically profit-driven, Lindsey et al. (2013) asserts that they still confer biodiversity gains. Most of these properties used to be livestock ranches and current management still depends on water and pasturage for wildlife, in addition to the free movement of game species (Brown, 2009). These properties benefit from the porous fence, since valuable game species and specially protected species attract visitors and as long as they comply to permit requirements, landowners may benefit from these species. Policies are restrictive however, especially those pertaining to game fences and monitoring by the state (Lindsey et al., 2013). Many respondents continue practicing livestock production, yet regularly benefit from game species on their land, although they do not formally register as game reserves or wildlife management areas (Zimmermann et al., 2014). The same goes for freehold conservancies where individual landowners have opted to drop perimeter fences and manage their properties as contiguous units. Lastly, on resettlement farms, although they are conditioned by the same legislation as private (commercial) farms, emergent farmers still have a long way to go before they can efficiently partake in markets and start generating profits.

The resource governance systems are conditioned by various policies, based mostly on land tenure (Jones, 2008; Zimmermann et al., 2014). Incidences of competition and potential disagreement between land and resource users can be linked to conditions of access to land and natural resources rather than how land and resources are used. Similarly, between the ENP and its neighbors, perceptions of land use conflicts were linked not to whether the respondent had livestock or not, but rather to whether they owned the land or only had usufructuary rights over its resources, such as in communal conservancies and on the resettlement farm.

The rationale for an expanded protected area network should therefore facilitate a better fit of these different governance approaches and prioritize a landscape approach to management. A multiplicity of governance types implies that checks and balances are in place since a diverse and more inclusive group of stakeholders are invested in trying to ensure sustainable outcomes of an integrated landscape. Respondents across the landscape mentioned that a lack of grazing and the poor availability of water contribute to land use conflicts with neighbors and affects the manner in which they govern their land. The challenge lies in assessing whether an expanded protected area network regime or approach to landscape management might offer a better overall fit with the ecosystem services attributes at stake, namely underground water provision and pasturage. An expanded protected area network focused on the conservation of ecosystem services needs to allow for multiple land uses, as well as multiple landowners. Those involved in the landscape might need to consider eliminating internal fences and entering multi-tenure systems where land and natural resource management is attained through written agreements based on a shared vision of the landscape.

The conflicts mentioned relating to livestock production issues and human-wildlife conflict could also be avoided by applying an integrated landscape approach across the different governance systems. This would demand cooperative mechanisms that the proposed Parks and Wildlife Management Bill of 2009 makes provision for. Under the Bill, conditions are made for 'protected landscapes' (Jones, 2012; Zimmermann et al., 2014). These areas maintain landscapes, habitats and species diversity whilst supporting economic growth within local communities amongst a variety of different land uses (Draft Parks and Wildlife Management Bill of 2009). According to the Bill, the state is compelled to maintain a network of protected areas that represent Namibia's biological diversity, landscapes and ecosystems. Also, this network has to be managed for the perpetual protection of such biodiversity, landscapes, seascapes or ecosystems for the benefit of current and future generations (Draft Parks and Wildlife Management Bill of 2009). Zimmermann et al. (2014) contend that this approach, which emphasizes cooperation among different stakeholders, and views entire ecological systems as the units of conservation, rather than individually owned properties, has firmly taken root among all stakeholders in conservation in Namibia.

The question is why the Draft Bill has taken so long to come into operation. A possible hindrance to the passage of the Bill is that land rights devolve from tenure, and as a result, not all policies are equally applicable to all land in Namibia (Watson and Odendaal, 2009). Simply put, land tenure dictates who has access to use land and natural resources. If private landowners choose to use their land for livestock production and comply with sectorial policy on that regard, no policy, however well drafted, can force them to convert to wildlife production. And why should they, if a mosaic of land uses in a landscape, especially in arid rangelands,

is considered more resilient (O'Farrell et al., 2009; O'Farrell et al., 2010; Cumming, 2011)? Another possible hindrance lies in the reluctance of the state to fully devolve rights over wildlife to private game farm owners and resident communities (Watson and Odendaal, 2009; Zimmermann et al., 2014). Current legislation prescribes the circumstances when specially protected and protected game may be used and by whom. These may only be hunted under the virtue of a permit issued by the MET, with permit allocations being based upon sustainable off-take quotas (Weaver and Peterson, 2008). Together with the poor involvement of the state and the ENP in actively promoting the implementation of an expanded protected area network in the study area, this implies that the interest of an integrated conservation landscape is mostly directed by the private sector and private landowners. The reluctance to implement an integrated protected area network could thus be attributable to the state pursuing a 'back to the barriers' protected area governance approach, recentralization and the alienation of local level stakeholders' interests (Hutton et al., 2005; Ribot et al., 2006).

5. Conclusion

The current governance approaches, as isolated institutional approaches in the landscape, do not provide a suitable fit to the ecosystem services attributes of the study area. An integrated approach, as proposed by the Parks and Wildlife Management Bill of 2009 could provide an enhanced fit. Despite the slow passage of the Bill, other initiatives have embraced an integrated approach to incorporating different land uses compatible with biodiversity conservation and under different land tenure. There is a risk, however, that these initiatives might exclude resident communities and could result in institutional misfit. Rather, the focus should be on identifying the issues that are on a landscape scale, such as management of water catchments, and constructing governance structures that directly fit these. An analysis of social networks and how information is disseminated could provide insight into the possibility of multi-stakeholder forums in the landscape, while an understanding of traditional and Western methods of governance could foster mixed-method approaches.

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Appendix A. Supplementary data

Supplementary data associated with this article can be found, in the online version, at http://dx.doi.org/10.1016/j.ecoser.2017.08.008.

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